Biogeochemical Cycles

- The biogeochemical cycle is the circulation of substances through living organisms from/to the environment

Water

- Cells contain 70-90 percent water
- Lakes, rivers, streams, and oceans contain a large portion of Earth's water
- The atmosphere also contains water

Groundwater

- Water in the soil or in underground formations of porous rock

Water Cycle

- The continuous movement of water between the atmosphere, the land, and the oceans is known as the water cycle
- Three main components of the water cycle:
  - Evaporation
  - Transpiration
  - Precipitation

Water Cycle

- Evaporation
  - Adds water to the atmosphere
- Transpiration
  - The process by which water evaporates from the leaves of plants in terrestrial ecosystems
- Precipitation
  - Water leaves the atmosphere in form of precipitation

Carbon Cycle

- The movement of carbon from the non-living environment into living things and back to non-living things

Carbon Cycle

- In photosynthesis, plants and other autotrophs use carbon dioxide (CO_2), along with water and solar energy, to make carbohydrates
- Both heterotrophs and autotrophs use oxygen to break down carbohydrates during cellular respiration

Carbon Cycle

- The byproducts of cellular respiration are:
  - Carbon Dioxide
  - Water
- Decomposers release carbon dioxide into the atmosphere when they break down organic compounds

Nitrogen Cycle

- All organisms need nitrogen to make proteins and nucleic acids
- The complex pathway that nitrogen follows in an ecosystem is called the nitrogen cycle
- Nitrogen gas (N_2) makes up about 78% of the atmosphere

Nitrogen Cycle

- Most plants can use nitrogen only in the form of nitrate
- The process of converting N_2 gas to nitrate is called nitrogen fixation
- Most organisms rely on nitrogen-fixing bacteria to transform nitrogen gas into a usable form

Nitrogen Cycle

- Dead organisms contain nitrogen, mainly in proteins and nucleic acids.
- Decomposers break down these materials and release the nitrogen they contain as ammonia (NH_3), which in soil becomes ammonium (NH_4)
  - This process is called ammonification

Nitrogen Cycle

- Nitrification is a process in which soil bacteria take up ammonium and oxidize it into nitrites, NO_2^- and nitrates NO_3^-
- Denitrification occurs when anaerobic bacteria break down nitrates and release nitrogen gas back into the atmosphere

Phosphorous Cycle

- The phosphorous cycle is the movement of phosphorous from the environment to organisms and then back to the environment